Comments on SEEDS Formulation Workshop

February 5-7, 2002

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This note summarizes a few retrospective comments on the SEEDS Formulation Workshop.

Remarks on Specific Study Team Topics

RE Reuse and Reference Architecture

The Reuse and Reference Architecture Study Team asks whether the topic should be attempted. Because of the difficulty and risk, I would recommend ESE not pursue this.

My view is that reference architectures and reuse frameworks are "backward looking": you usually have a pretty good idea how to build the system after you have built it.

"Reuse" is essentially backward looking: the old component is "good enough" will be used until it is completely unusable. This can definitely slow evolution.

A "Reference Architecture" essentially codifies what you understand about the past. It is *extremely* difficult to architect something that works well in the future; there is a significant risk that the reference architecture will hinder evolution and reuse.

RE Near Term Formats

The Near-Term Format Study Team reported that many near-term missions are planning to use current standards. This result was completely unsurprising.

First, missions want to be compatible with precursors, which argues for continuing past practices. Second, to the degree that current systems are working and can be adapted to near term future use, the lowest-risk and lowest-cost approach is to reuse current systems, however imperfect.

These findings are both good news and bad news. The good news is that evidently the current situation is good enough that planners are willing to continue to use it. The bad news is that these decisions are most likely backward-looking; opting continuity and risk avoidance. Potential opportunities for evolution and technology infusion are being passed up.

Note the lesson here for the SEEDS vision: the existence of conditions conducive to evolution need not necessarily produce any change at all.

RE Technology Infusion

Clearly, the SEEDS vision aims to have systems that evolve and adopt new technology rapidly and cheaply. The discussion of Technology Infusion was quite interesting.

From the discussion, it appears that there is no complete understanding of how technology currently gets adopted by ESE data services. ESTO has intentionally not been attempting to fund or manage the "productization" of new technology. Infusion is apparently up to individual organizations, and is done in a case-by-case fashion.

Furthermore, to the degree that infusion is understood and practiced, current knowledge probably does not extend to the SEEDS 'cloud of services' vision. How would technical innovation be introduced and diffused through a 'federation' of autonomous players, which is managed by 'consensus'?

A third point reflects my own view that the entire concept of a federation of services has many open research questions, i.e., many of the proposed features of SEEDS are at TRL6 or below. These concepts need to be brought up to TRL9.

I would suggest three important questions about Technology Infusion for the SEEDS Formulation process:
1. How is technology currently infused/adopted in the ESE data systems?
    a. What are the Lessons Learned and Best Practices?
2. How can and should these lessons be applied to promote evolution and technology infusion in a federation environment?
    a. What are useful models and concepts of technology diffusion in a SEEDS federation?
3. What needs to be learned about the fundamental nature and evolution of federated systems? Questions might include:
    a. How should the process of creating and maintaining of consensus-based standards be done?
    b. How should traceability and accountability in federations be done?
    c. How can long-term sustainability be assured in a decentralized federation?
    d. How can free and charged services interoperate?
I would recommend that ESTO or other organizations fund studies to investigate these and related issues.

The NewDISS/SEEDS Vision: Need Evidence for the Claims

I urge the SEEDS Formulation teams to marshal a much more solid case for how the SEEDS vision will actually meet the necessary goals of the ESE. In my view, the SEEDS/NewDISS Lessons Learned is basically a manifesto. Where is the supporting evidence for these claims? Where is the peer reviewed publication of the findings and their basis?

My own view is that the Federation was/is an uncontrolled (and unpublished) short-term experiment, from which it is unwise to draw long-term conclusions. "Nuggets" are essentially "testimonial" evidence. I would need to see real clinical trials before I would certify the federation as "safe and effective".